

## FOLK MEDICINE OF TRÁS-OS-MONTES (PORTUGAL). TRADITIONAL USES AND BIOACTIVE COMPOUNDS OF SIX COMMON MEDICINAL SPECIES

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Ethnobotanical surveys conducted in north-eastern Portugal reported plant knowledge and uses of several wild species in folk medicine, based on field studies using participant observation, unstructured and structured interviews, including freelisting and free pile-sorting. Taking advantage of a multidisciplinary team, besides botanical inventories and sociocultural and anthropological studies, we set out applied phytochemical research on locally used medicinal plants (more frequently cited, i.e. frequency of citation > 50%) that have special cultural significance. Considering the use reports and informants' selected sites, as well as, local consumers' criteria and the optimal growth stage of each species, samples were collected for analysis with informants' permission and cooperation. Epidemiological and experimental studies have consistently shown an inverse association between consumption of greens and fruits and the risk for chronic diseases. These physiological functions may be partly attributed to the abundance of antioxidants such as vitamin C, vitamin E,  $\beta$ -carotene and phenolics. This study reports the first approach to the antioxidant potential evaluation of six species (*Glechoma hederaceae*, *Foeniculum vulgare*, *Malva sylvestris*, *Oregano virens*, *Rosa canina*, *Thymus mastichina*), often used in folk medicine, accessed by biochemical assays used as models for the lipid peroxidation damage in biomembranes. Bioactive compounds such as phenolics, flavonoids, vitamin C and vitamin E were also determined. Significantly negative linear correlations were observed between the bioactive compounds and antioxidant activity EC<sub>50</sub> values. Experimental phytochemical research points to pharmacological effects that confirm the importance of the empirical use of these species and their contribution to a good health condition.

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## 1. Introduction/Introducción

Ethnobotanical surveys conducted in north-eastern Portugal along several years (2000-2009) reported plant knowledge and use of almost 150 wild species used in folk medicine. This poster documents traditional knowledge and reports the first approach to the antioxidant potential evaluation of six of these species with particular cultural significance, *Glechoma hederaceae* (1), *Foeniculum vulgare* (2), *Malva sylvestris* (3), *Oregano virens* (4), *Rosa canina* (5), *Thymus mastichina* (6), accessed by biochemical assays used as models for the lipid peroxidation damage in biomembranes. Bioactive compounds such as phenolics, flavonoids, vitamin C and vitamin E were also determined.

Los estudios etnobotánicos llevados a cabo desde el año 2000 en el nordeste del territorio portugués permitieron la recolección del saber popular y de los usos de casi 150 especies silvestres utilizadas frecuentemente en la medicina popular. Este panel presenta el conocimiento tradicional y una primera aproximación del potencial antioxidante de seis de las especies inventariadas *Glechoma hederaceae* (1), *Foeniculum vulgare* (2), *Malva sylvestris* (3), *Oregano virens* (4), *Rosa canina* (5), *Thymus mastichina* (6), determinado por ensayos bioquímicos modelados para daños de la peroxidación lipídica en biomembranas celulares. También se han determinado compuestos bioactivos, fenoles, flavonoides, vitaminas C y E.

## 3. Results/Resultados

**Table 1.** Ethnobotanical information about the six species studied. Surveyed area: Bragança, Vinhais and Miranda do Douro, three municipalities of the North-eastern Portugal. Frequency of citation > 50%

Species	Local name	Part of plant used/preparation	Medicinal use or property	Edible use
<i>Glechoma hederacea</i>	L. Malvela, malbela	Leaves/infusion	Depurative, antiseptic, digestive, carminative, emmenagogue, dysmenorrhoeic, restorative, panacea	Condiment/spices flavouring and seasoning traditional dishes. In soup mixed with other greens
<i>Foeniculum vulgare</i>	Mill. Folho, funcho, erva-doce	Shoots and inflorescences /infusion	Depurative, diuretic, antiseptic, anti-inflammatory digestive, carminative, galactagogue, panacea	Condiment/spices flavouring and seasoning soup and stews Raw in salads Spirts, cakes and pastries To cook chestnuts
<i>Malva sylvestris</i>	L. Malva	Leaves /infusion or decoction	Anti-inflammatory, skin infections, throat pain, panacea. Veterinary	Fruits sucked by children and shepherds
<i>Origanum vulgare</i>	L. Oregão, mangerico do monte	Inflorescences /infusion	Stomachic, digestive, carminative, laxative, expectorant, cold, cough, kidney regulator	Condiment/spices flavouring and seasoning traditional dishes and sausages. Summer salads. To preserve olives
<i>Rosa canina</i>	L. sl. Roseira brava, gravanceira,, silva -gravanceira	Fruits /decoction or maceration in brandy	Diuretic, antidiarrhoea, antirheumatics, anti-inflammatory, respiratory and decongestant, skin infections, stimulant and tonic. Veterinary	Fruits (hipantium) eaten raw
<i>Thymus mastichina</i>	L. Bela - luz, sal -puro, salpuro, tomilho - branco	Inflorescences /infusion	Indigestion, carminative, cold, cough, throat pain, nasal congestion, panacea	Condiment/spices flavouring and seasoning traditional dishes and salads. To preserve olives. Used instead of salt.

- Several wild species were simultaneously mentioned for medicinal and food purposes. Besides their medicinal interest, these species had always a significant use in local cuisine, specifically to preserve food, such as olives, sausages and pickles.
- Throughout historical periods of starvation, they were the tastiest ingredient of very poor, insufficient and monotonous daily meals.
- Since they are important ingredients of the folk pharmacopoeia and traditional cuisine some of them have been semi-domesticated and are still cultivated in homegardens and present in every homesteads.

## 4. Conclusion/Conclusión

- Experimental phytochemical research points to pharmacological effects that confirm the importance of the empirical use of these species and their contribution to a good health condition.
- The radical scavenging activity and lipid peroxidation inhibition capacity support their uses in folk medicine against several chronic diseases known to be related to the production of ROS and oxidative stress.

## 2. Methodology/Metodología

- Ethnobotanical surveys: field studies, participant observation, unstructured and structured interviews, free-listing and free pile-sorting.
- Sampling: Considering the use reports and informants' selected sites, as well as, local consumers' criteria and the optimal growth stage of each species, samples of different plant parts (leaves, shoots, flowers and fruits) were collected with informants' permission and cooperation.
- Phytochemicals analysis: Phenolics, flavonoids and ascorbic acid by spectrophotometer techniques.
- Chemical assays: DPPH radical scavenging capacity and reducing power.
- Biochemical assays: inhibition of  $\beta$ -carotene bleaching and inhibition of lipid peroxidation in brain tissue (TBARS assay).
- Inventario etnobotánico, observación-participante, entrevistas abiertas y estructuradas, encuestas en el campo y categorización libre.
- Análisis fitoquímicos por espectrofotometría.
- Evaluación de propiedades antioxidantes: poder reductor y inhibición del radical libre DPPH; ensayo TBARS

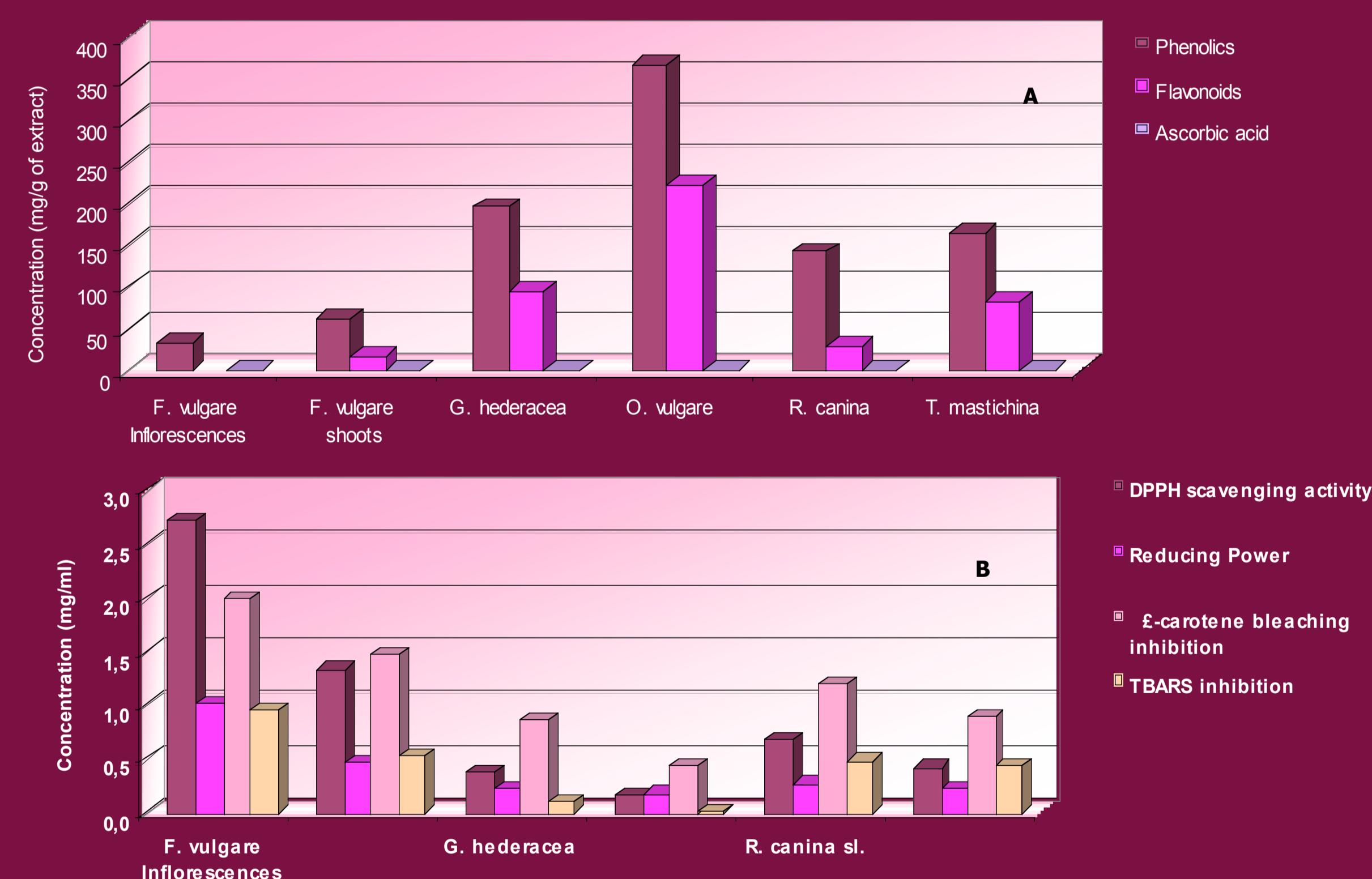


Figura 1 – A: Bioactive compounds; B: Antioxidant activity EC<sub>50</sub> values

- Phenolics and particularly flavonoids, were the main antioxidant compounds found in the samples. *O. vulgare* presented the highest values.
- *Origanum vulgare* gave the best results in all the antioxidant activity assays (EC<sub>50</sub> values  $\leq$  0.45 mg/ml), which is in agreement with the highest content in phenolics found in this species.
- The very low EC<sub>50</sub> value (0.01 mg/ml) obtained for TBARS inhibition in brain homogenates is very promising, considering that brain is highly sensitive to oxidative damage.

## 5. Acknowledgements/Agradecimientos

We are grateful to all the people of Trás-os-Montes communities for participating and sharing with us all their knowledge, enthusiasm and patience. We also thanks Elisabete Martins who collaborated in data collection.

## Research Projects and funding/Proyectos y financiación:

Etnobotânica do Parque Natural de Montesinho (PRODEP). CIMO and Foundation for Science and Technology (Portugal). Etnobotânica do Nordeste Português: Saberes, plantas e usos (POCI/ANT/59395/2004). L. Barros grant (SFRH/BPD/4609/2008).

